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L1: Entry 1 of 15 File: USPT Aug 13, 2002

US-PAT-NO: 6432669
DOCUMENT-IDENTIFIER: US 6432669 B1

TITLE: Protective recombinant Haemophilus influenzae high molecular weight proteins

DATE-ISSUED: August 13, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Aventis Pasteur Limited	Toronto			CA	03

APPL-NO: 09/ 206942 [PALM]
DATE FILED: December 8, 1998

PARENT-CASE:
REFERENCE TO RELATED APPLICATION This application is a continuation-in-part of application Ser. No. 09/167,568 filed Oct. 7, 1998 now abandoned.

INT-CL: [07] C12 P 21/06

US-CL-ISSUED: 435/69.1; 435/69.3, 435/69.7, 435/71.1, 435/243, 435/252.3, 435/320.1, 536/23.1, 536/23.7, 536/24.1, 424/256.1
US-CL-CURRENT: 435/69.1; 424/256.1, 435/243, 435/252.3, 435/320.1, 435/69.3, 435/69.7, 435/71.1, 536/23.1, 536/23.7, 536/24.1

FIELD-OF-SEARCH: 435/320.1, 435/69.1, 435/243, 435/252.3, 435/69.3, 435/71.1, 435/69.7, 424/256.1, 536/23.1, 536/23.7, 536/24.1

PRIOR-ART-DISCLOSED:

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Search Selected | Search ALL

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☐	5194254	March 1993	Barber et al.	424/85.8
☐	5603938	February 1997	Barenkamp	424/256.1

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WO 92/17167	October 1992	WO	
WO 93/19090	September 1994	WO	
WO 94/21290	September 1994	WO	
WO 97/36914	October 1997	WO	
WO 97/36914	October 1997	WO	

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ART-UNIT: 1645

PRIMARY-EXAMINER: Graser; Jennifer E.

ABSTRACT:

Protective high molecular weight (HMW) proteins are produced recombinantly by expression from E. coli by using a promoter effective in E. coli and a nucleic acid molecule which contains a modified operon of a non-typeable strain of Haemophilus. The modified operon contains the portion only of the A region which encodes the mature HMW protein and the complete B and C regions of the operon. Enhanced levels of expression of the HMW proteins can be achieved by including the E. coli cer gene, a further copy of the portion of the A region of the operon encoding the mature protein or both in the expression vector. Nucleotide and deduced amino acid sequences of the hmw1 and hmw2 genes and HMW1 and HMW2 proteins, respectively of several non-typeable Haemophilus influenzae strain have been identified.

21 Claims, 236 Drawing figures

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L1: Entry 1 of 15 File: USPT Aug 13, 2002

US-PAT-NO: 6432669
DOCUMENT-IDENTIFIER: US 6432669 B1

TITLE: Protective recombinant Haemophilus influenzae high molecular weight proteins

DATE-ISSUED: August 13, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA

US-CL-CURRENT: 435/69.1; 424/256.1, 435/243, 435/252.3, 435/320.1, 435/69.3, 435/69.7, 435/71.1, 536/23.1, 536/23.7, 536/24.1

CLAIMS:

What we claim is:

1. A nucleic acid molecule comprising a promoter functional in E. coli and operatively coupled to a modified operon of a non-typeable strain of Haemophilus influenzae comprising a modified gene A, a B gene and a C gene and which encodes a high molecular weight (HMW) protein, wherein the modified A gene of the operon contains only a nucleic acid sequence which codes for a mature high molecular weight (HMW) protein of the non-typeable strain of Haemophilus influenzae and lacks the segment of the A gene which encodes the leader sequence for the HMW protein.

2. The nucleic acid molecule of claim 1 wherein said promoter is the T7 promoter.

3. The nucleic acid molecule of claim 1 wherein said operon encodes the high molecular weight protein 1 (HMW1) of the non-typeable strain of Haemophilus influenzae.

4. The nucleic acid molecule of claim 1 wherein said a non-typeable strain of Haemophilus is selected from the group consisting of strains 12, Joyc, K21, PMH1 and 15 of non-typeable Haemophilus influenzae.

5. The nucleic acid molecule of claim 1 wherein said operon encodes the high molecular weight protein 2 (HMW2) of the non-typeable of Haemophilus influenzae.

6. The nucleic acid molecule of claim 5 wherein the non-typeable strain of Haemophilus is selected from the group consisting of strains 12, Joyc, K21, LCDC2, PMH1 and 15 of non-typeable Haemophilus influenzae.

7. The nucleic acid molecule of claim 1 wherein said nucleic acid sequence which codes for a mature high molecular weight protein has a nucleic acid sequence selected from those having SEQ ID NOS: 27, and 31.

8. The nucleic acid molecule of claim 1 wherein said nucleic acid sequence which

codes for a mature high molecular weight protein encodes a HMW1 or HMW2 protein having an amino acid sequence selected from those having SEQ ID NOS: 28, and 32.

9. The nucleic acid molecule of claim I further comprising a further copy of the nucleic acid sequence encoding the mature high molecular weight protein of a non-typeable strain of Haemophilus influenzae.

10. The nucleic acid molecule of claim 1 further comprising the cer gene of E. coli.

11. The nucleic acid molecule of claim 1 further comprising the cer gene of E. coli and a further copy of the nucleic acid sequence encoding the mature high molecular weight protein of a non-typeable strain of Haemophilus influenzae.

12. An isolated and purified nucleic acid molecule encoding a high molecular weight (HMW) protein of a non-typeable strain of Haemophilus influenzae consisting of: (a) a DNA sequence selected from the group consisting of SEQ ID NOS: 25, 27, 29, and 31; or (b) a DNA sequence encoding a high molecular weight protein having an amino acid sequence selected from the group consisting of SEQ ID NOS: 26, 28, 30, and 32.

13. A vector for transformation of a host cell comprising the nucleic acid molecule of claim 1.

14. The vector of claim 13 which is a plasmid vector.

15. The vector of claim 14 wherein said plasmid which is selected from group consisting of:

DS-1046-1-1	(ATCC No.: 203263),
JB-2507-7	(ATCC No.: 203262),
BK-86-1-1	(ATCC No.: 203258),
BK-35-4	(ATCC No.: 203259),
BK-76-1-1	(ATCC No.: 203261),
DS-2334-5	(ATCC No.: 203260), and
DS-2400-13	(ATCC No.: 203257).

16. A strain of E. coli transformed by an expression vector of claim 14 and expressing a protective high molecular weight protein of a non-typeable strain of Haemophilus.

17. A method of the production of a protective high molecular weight protein of a non-typeable strain of Haemophilus influenzae, which comprises: transforming E. coli with a vector as claimed in claim 14, growing E. coli to express the encoded mature high molecular weight (HMW) protein, B, protein and C protein and isolating and purifying the expressed HMW protein.

18. The method of claim 17 wherein said non-typeable strain of Haemophilus is selected from the group consisting of strains 12, Joyc, K21, LCDC2, PMH1 and 15 of non-typeable Haemophilus.

19. The method of claim 17 wherein the high molecular weight protein is an HMW1 protein of the non-typeable strain of Haemophilus.

20. The method of claim 17 wherein the high molecular weight protein is an HMW2 protein of the non-typeable strain of Haemophilus.

21. The method of claim 17 wherein said isolation and purification procedure includes separating the HMWA protein from the B and C proteins.

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L1: Entry 3 of 15 File: USPT Jan 29, 2002

US-PAT-NO: 6342232
DOCUMENT-IDENTIFIER: US 6342232 B1

TITLE: Multi-component vaccine comprising at least three antigens to protect against disease cased by Haemophilus influenzae

DATE-ISSUED: January 29, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Aventis Pasteur Limited	Toronto			CA	03

APPL-NO: 09/ 261182 [PALM]
DATE FILED: March 3, 1999

INT-CL: [07] A61 K 39/102

US-CL-ISSUED: 424/256.1; 424/193.1, 424/200.1, 424/201.1, 424/203.1, 424/202.1, 424/282.1, 435/69.1, 530/350
US-CL-CURRENT: 424/256.1; 424/193.1, 424/200.1, 424/201.1, 424/202.1, 424/203.1, 424/282.1, 435/69.1, 530/350

FIELD-OF-SEARCH: 424/193.2, 424/200.1, 424/201.1, 424/202.1, 424/256.1, 424/282.1, 424/163.1, 424/203.1, 435/69.1, 435/252.3, 435/320.1, 536/23.7, 530/350

PRIOR-ART-DISCLOSED:

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☐	5506139	April 1996	Loosmore et al.	
☐	5603938	February 1997	Barenkamp	
☐	5646259	July 1997	St. Geme, III et al.	
☐	5869302	February 1999	Loosmore	

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WO 94/21290	September 1994	WO	
WO 95/34308	December 1995	WO	
97/36914	October 1997	WO	
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ART-UNIT: 1645

PRIMARY-EXAMINER: Graser; Jennifer E.

ABSTRACT:

A multi-component immunogenic composition confers protection on an immunized host against infection caused by Haemophilus influenzae. Such composition comprises at least three different antigens of Haemophilus influenzae, two of which are adhesins. High molecular weight (HMW) proteins and Haemophilus influenzae adhesin (Hia) proteins of non-typeable Haemophilus influenzae comprise the adhesin components while the other antigen is a non-proteolytic analog of Hin47 protein. Each component does not impair the immunogenicity of the others. The Haemophilus vaccine may be combined with DTP component vaccines, which may contain inactivated poliovirus, including type 1, type 2 and/or type 3, and/or a conjugate of a capsular polysaccharide of Haemophilus influenzae and tetanus or diphtheria toxoid, including PRP-T, to provide a multi-valent component vaccine without impairment of the immunogenic properties of the other antigens.

20 Claims, 28 Drawing figures

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L1: Entry 3 of 15 File: USPT Jan 29, 2002

US-PAT-NO: 6342232
DOCUMENT-IDENTIFIER: US 6342232 B1

TITLE: Multi-component vaccine comprising at least three antigens to protect against disease cased by Haemophilus influenzae

DATE-ISSUED: January 29, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA

US-CL-CURRENT: 424/256.1; 424/193.1, 424/200.1, 424/201.1, 424/202.1, 424/203.1, 424/282.1, 435/69.1, 530/350

CLAIMS:

What we claim is:

1. An immunogenic composition for conferring protection in a host against disease caused by Haemophilus influenzae, which comprises:

(a) an isolated and purified analog of Haemophilus influenzee Hin47 protein having a decreased protease activity which is less than about 10% of natural Hin47 protein,

(b) an isolated and purified Haemophilus influenzae adhesin (Hia) protein of a non-typeable strain of Haemophilus influenzae, and

(c) an isolated and purified high molecular weight (HMW) protein of a non-typeable strain of Haemophilus influenzae.

2. The composition of claim 1 wherein said Hin47, Hia and HMW proteins are present in amounts which do not impair the individual immunogenicities of the proteins.

3. The composition of claim 2 wherein said analog of Hin47 protein is one in which at least one amino acid of the natural Hin47 protein contributing to protease activity has been deleted or replaced by a different amino acid and which has substantially the same immunogenic properties as natural Hin47 protein.

4. The composition of claim 3 wherein said at least one amino acid is selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein.

5. The composition of claim 4 wherein Serine-197 is replaced by alanine.

6. The composition of claim 4 wherein Histidine-91 is replaced by alanine, lysine or arginine.

7. The composition of claim 6 wherein Histidine-91 is replaced alanine.

8. The composition of claim 4 wherein Asp-121 is replaced by alanine.

9. The composition of claim 2 wherein said Hia protein is produced recombinantly.

10. The composition of claim 9 wherein said recombinantly-produced Hia protein is an N-terminal truncation to position 37 and having a valine at position 38 (V38 rHia).

11. The composition of claim 2 wherein said HMW protein is an HMW1 or HMW2 protein of a non-typeable strain of Haemophilus influenzae.

12. The composition of claim 11 wherein the HMW1 and HMW2 proteins are produced recombinantly.

13. The composition of claim 11 wherein said HMW1 and HMW2 proteins are isolated from the respective strain of non-typeable Haemophilus influenzae and possess respective molecular weights as set forth in the following Table:

Molecular Weight (kDa) non-typeable H. influenzae Strain

		11	JoyC	K21	LCDC2	PMH1	15
Mature	HMW1	125	125.9	104.4	114.0	102.4	103.5
Protein:	HMW2	120	100.9		111.7	103.9	121.9.

14. The composition of claim 1 further comprising an adjuvant.

15. The composition of claim 14 wherein said adjuvant is aluminum hydroxide or aluminum phosphate.

16. The composition of claim 1 comprising

(a) about 25 to about 100 .mu.g of the Hin47 protein analog, and

(b) about 25 to about 100 .mu.g of the Hia protein, and

(c) about 25 to about 100 .mu.g of the HMW protein.

17. The composition of claim 1 further comprising at least one additional antigenic component for conferring protection against infection caused by another pathogen.

18. The composition of claim 1 wherein said at least one additional antigenic component is selected from the group consisting of diphtheria toxoid, tetanus toxoid, pertussis antigens, non-virulent poliovirus and PRP-T.

19. The composition of claim 18 wherein said pertussis antigens are selected from the group consisting of pertussis toxoid, filamentous hemagglutinin, pertactin and agglutinogens.

20. A method of immunizing a host against disease caused by infection with Haemophilus influenzae, including otitis media, which comprises administering to the host an immunoeffective amount of a composition as claimed in claim 1.

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L1: Entry 2 of 15 File: USPT May 21, 2002

US-PAT-NO: 6391313
DOCUMENT-IDENTIFIER: US 6391313 B1

TITLE: Multi-component vaccine to protect against disease caused by Haemophilus influenzae and Moraxella catarrhalis

DATE-ISSUED: May 21, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA
Sasaki; Ken	Willowdale			CA

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Aventis Pasteur Limited	Toronto			CA	03

APPL-NO: 09/ 353617 [PALM]
DATE FILED: July 15, 1999

INT-CL: [07] A61 K 39/116

US-CL-ISSUED: 424/203.1; 424/256.1, 424/251.1, 424/234.1, 424/193.1, 424/203.1, 424/197.11, 530/350
US-CL-CURRENT: 424/203.1; 424/193.1, 424/197.11, 424/234.1, 424/251.1, 424/256.1, 530/350

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PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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☐	4496538	January 1985	Gordon	
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☐	5603938	February 1997	Barenkamp	
☐	5646259	July 1997	St. Geme, III et al.	
☐	5808024	September 1998	Sasaki et al.	

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95/34308	December 1995	WO	
96/03506	February 1996	WO	
96/34960	November 1996	WO	
97/36914	October 1997	WO	

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ART-UNIT: 1645

PRIMARY-EXAMINER: Graser; Jennifer E.

ABSTRACT:

A multi-valent immunogenic composition confers protection on an immunized host against infection caused by both Haemophilus influenzae and Moraxella catarrhalis. Such composition comprises at least four antigens comprising at least one antigen from Haemophilus influenzae, and at least one antigen from Moraxella catarrhalis. Three of the antigens are adhesins. High molecular weight (HMW) proteins and Haemophilus influenzae adhesin (Hia) proteins of non-typeable Haemophilus and a 200 kDa outer membrane protein of Moraxella catarrhalis comprise the adhesin components while the other antigen is a non-proteolytic analog of Hin47 protein. Each component does not impair the immunogenicity of the others. The multi-valent immunogenic composition may be combined with DTP component vaccines, which may also include non-virulent poliovirus and PRP-T, to provide a component vaccine without impairment of the immunogenic properties of the other antigens.

22 Claims, 28 Drawing figures

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L1: Entry 2 of 15 File: USPT May 21, 2002

US-PAT-NO: 6391313
DOCUMENT-IDENTIFIER: US 6391313 B1

TITLE: Multi-component vaccine to protect against disease caused by Haemophilus influenzae and Moraxella catarrhalis

DATE-ISSUED: May 21, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Loosmore; Sheena M.	Aurora			CA
Yang; Yan-Ping	Willowdale			CA
Klein; Michel H.	Willowdale			CA
Sasaki; Ken	Willowdale			CA

US-CL-CURRENT: 424/203.1; 424/193.1, 424/197.11, 424/234.1, 424/251.1, 424/256.1, 530/350

CLAIMS:

What we claim is:

1. A multi-valent immunogenic composition for conferring protection in a host against disease caused by both Haemophilus influenzae and Moraxella catarrhalis, which comprises:

(a) an isolated and purified analog of Haemophilus influenzae Hin47 protein having a decreased protease activity which is less than about 10% of natural Hin47 protein,

(b) an isolated and purified Haemophilus influenzae adhesin (Hia) protein of a non-typeable strain of Haemophilus influenzae,

(c) an isolated and purified high molecular weight (HMW) protein of a non-typeable strain of Haemophilus influenzae, and

(d) an isolated and purified outer membrane protein of Moraxella catarrhalis having an apparent molecular mass of about 200 kDa, as determined by SDS-PAGE.

2. The composition of claim 1 wherein said Hin47, Hia, HMW and 200 kDa proteins are present in amounts which do not impair the individual immunogenicities of the proteins.

3. The composition of claim 2 wherein said analog of Hin47 protein is one in which at least one amino acid of the natural Hin47 protein contributing to protease activity has been deleted or replaced by a different amino acid and which has substantially the same immunogenic properties as natural Hin47 protein.

4. The composition of claim 3 wherein said at least one amino acid is selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein.

5. The composition of claim 4 wherein Serine-197 is replaced by alanine.

6. The composition of claim 4 wherein Histidine-91 is replaced by alanine, lysine or arginine.

7. The composition of claim 6 wherein Histidine-91 is replaced alanine.

8. The composition of claim 4 wherein Asp-121 is replaced by alanine.

9. The composition of claim 2 wherein said Hia protein is produced recombinantly.

10. The composition of claim 9 wherein said recombinantly-produced Hia protein is an N-terminal truncation to position 37 and having a valine at position 38 (V38 rHia).

11. The composition of claim 2 wherein said HMW protein is an HMW1 or HMW2 protein of a non-typeable strain of Haemophilus influenzae.

12. The composition of claim 11 wherein the HMW1 and HMW2 proteins are produced recombinantly.

13. The composition of claim 12 wherein said HMW1 and HMW2 proteins are isolated from the respective strain of non-typeable Haemophilus influenzae and possess respective molecular weights as set forth in the following Table:

Molecular Weight	non-typeable H. influenzae Strain					
(kDa)	12	JoyC	K21	LCDC2	PMH1	15
Mature HMW1	125	125.9	104.4	114.0	102.4	103.5
Protein: HMW2	120	100.9		111.7	103.9	121.9.

14. The composition of claim 2 wherein said 200 kDa protein is produced recombinantly.

15. The composition of claim 14 wherein recombinantly-produced 200 kDa protein is an N-terminal truncation V56 r200 kDa.

16. The composition of claim 1 further comprising an adjuvant.

17. The composition of claim 16 wherein said adjuvant is aluminum hydroxide or aluminum phosphate.

18. The composition of claim 1 comprising

(a) about 25 to about 100 .mu.g of the Hin47 protein analog, and

(b) about 25 to about 100 .mu.g of the Hia protein,

(c) about 25 to about 100 .mu.g of the HMW protein, and

(d) about 25 to about 100 .mu.g of the 200 kDa protein.

19. The composition of claim 1 further comprising at least one additional antigenic component for conferring protection against infection caused by another pathogen.

20. The composition of claim 1 wherein said at least one additional antigenic component is selected from the group consisting of diphtheria toxoid, tetanus toxoid, pertussis antigens, non-virulent poliovirus and PRP-T.

21. The composition of claim 20 wherein said pertussis antigens are selected from the group consisting of pertussis toxoid, filamentous hemagglutinin, pertactin and agglutinogens.

22. A method of immunizing a host against disease caused by infection with both Haemophilus influenzae and Moraxella catarrhalis, including otitis media, which comprises administering to the host an immunoeffective amount of a composition as claimed in claim 1.

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L1: Entry 13 of 15 File: USPT Feb 9, 1999

US-PAT-NO: 5869065
DOCUMENT-IDENTIFIER: US 5869065 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		
St. Geme, III; Joseph William	St. Louis	MO		

US-CL-CURRENT: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

CLAIMS:

What we claim is:

1. A vaccine against diseased caused by non-typeable Haemophilus influenza, including otitis media, sinusitis and bronchitis, which comprises a mixture of (1) HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID No:1), having the derived amino acid sequence of FIG. 2 (SEQ ID No:2) and having an apparent molecular weight of 125 kDa and (2) HMW2 encoded by the DNA sequence shown in FIG. 3 (SEQ ID No:3), having the derived amino acid sequence of FIG. 4 (SEQ ID No:4) and having an apparent molecular weight of 120 kDa, and a physiological carrier for said mixture.

08/530,198

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L1: Entry 13 of 15 File: USPT Feb 9, 1999

US-PAT-NO: 5869065
DOCUMENT-IDENTIFIER: US 5869065 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		
St. Geme, III; Joseph William	St. Louis	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Board of Trustees of the Leland Stanford Junior University	Stanford	CA			02

APPL-NO: 08/ 530198 [PALM]
DATE FILED: December 13, 1995

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102(E)-DATE
PCT/US94/02550	March 15, 1994	WO94/21290	Sep 29, 1994	Dec 13, 1995	Dec 13, 1995

INT-CL: [06] A61 K 39/102

US-CL-ISSUED: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7
US-CL-CURRENT: 424/256.1; 424/185.1, 424/190.1, 530/350, 536/23.1, 536/23.7

FIELD-OF-SEARCH: 424/185.1, 424/256.1, 424/190.1, 530/350, 536/23.1, 536/23.7

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

Barenkamp et al. Infection & Immunity Apr. 1992 60(4): pp. 1302-1313.
Barenkamp (Ped. Res. 1991 29(4) pt. 2., 167A, Abstract No. 985).
Barenkamp et al. (Ped. Inf. Dis. J. 1990 9(5):333-339.

ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described.

Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

1 Claims, 68 Drawing figures

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L1: Entry 15 of 15 File: USPT Aug 27, 1996

US-PAT-NO: 5549897
DOCUMENT-IDENTIFIER: US 5549897 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: August 27, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		
St. Geme, III; Joseph W.	St. Louis	MO		

US-CL-CURRENT: 424/256.1; 435/851, 530/350

CLAIMS:

What we claim is:

1. A vaccine against disease caused by non-typeable Haemophilus influenzae, including otitis media, sinusitis and bronchitis, comprising an effective amount of a high molecular weight protein of non-typeable Haemophilus influenzae which is protein HMW1 and/or HMW2 and a physiological carrier therefor.

2. The vaccine of claim 1 wherein said protein is HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID NO:1), having the derived amino acid sequence of FIG. 2 (SEQ ID ID NO:2) and having an apparent molecular weight of 125 kDa.

3. The vaccine of claim 1 wherein said protein is HMW2 encoding by the DNA sequence shown in FIG. 3 SEQ ID NO:3), having the derived amino acid sequence of FIG. 4 SEQ ID NO:4) and having an apparent molecular weight of 120 kDa.

08/388,682 filed 3/9/93

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End of Result Set

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L1: Entry 15 of 15 File: USPT Aug 27, 1996

US-PAT-NO: 5549897
DOCUMENT-IDENTIFIER: US 5549897 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: August 27, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		
St. Geme, III; Joseph W.	St. Louis	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO			02
Washington University	St. Louis	MO			02

APPL-NO: 08/ 038682 [PALM]
DATE FILED: March 16, 1993

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [06] A61 K 39/102, A61 K 38/16

US-CL-ISSUED: 424/256N; 435/851, 530/350
US-CL-CURRENT: 424/256.1; 435/851, 530/350

FIELD-OF-SEARCH: 424/92, 424/88, 424/256.1, 435/851, 530/350

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

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Infection and Immunity, vol. 60(4), issued Apr. 1992, S. J. Barenkamp et al,

"Cloning, Expression and DNA Sequence Analysis of Genes Encoding Nontypeable Haemophilus influenzae High -Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of Bordetella pertussis," pp. 1302-1313, see entire document.
Infection and Immunity, vol. 52(2), issued May 1986, S. J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemphilus influenzae Otitis Media", pp. 572-578, see Figs. 1 and 2.
Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R. A. Young et al, "Efficient Isolation of Genes by Using Antibody Probes, "pp. 1194-1198, see entire document.
Journal of Molecular Biology, vol. 157, issued 1982, J. Kyte et al, "A Simple Method for Displaying the Hydrophatic Character of a Protein", pp. 105-132, see entire document.
Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T. P. Hopp et al, "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.
Infection and Immunity, vol. 45(3), issued Sep. 1984, R. Schneerson et al, "Serum Antibody Responses of Juvenile and Infant Rhesus Monkeys Injected with Haemophilus influenzae Type b and Pneumoccus Type 6A Capsular Polysaccharide-Protein Conjugates", pp. 582-591, see entire document.

ART-UNIT: 182

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Krsek-Staples; Julie

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

3 Claims, 68 Drawing figures

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L1: Entry 12 of 15 File: USPT Mar 2, 1999

US-PAT-NO: 5876733
DOCUMENT-IDENTIFIER: US 5876733 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: March 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

US-CL-CURRENT: 424/256.1; 424/185.1, 424/193.1, 424/197.11, 530/350, 536/23.1, 536/23.7

CLAIMS:

What I claim is:

1. A conjugate comprising an isolated and purified high molecular weight protein of non-typeable Haemophilus influenzae which is selected from the group consisting of HMW1 encoded by the DNA sequence shown in FIG. 1 (SEQ ID no: 1) having the amino acid sequence shown in FIG. 2 (SEQ ID no:2) and having an apparent molecular weight of 125 kDa and HMW2 encoded by the DNA sequence shown in FIG. 3 (SEQ ID no: 3) having the derived amino acid sequence of FIG. 4 (SEQ ID n: 4) and having an apparent molecular weight of 120 kDa linked to an antigen, hapten or polysacharide for eliciting an immune response to said antigen, hapten or polysaccharide.

2. The conjugate as claimed in claim 1 wherein said polysaccharide is a protective polysaccharide against Haemophilus influenzae type b.

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L1: Entry 12 of 15 File: USPT Mar 2, 1999

US-PAT-NO: 5876733
DOCUMENT-IDENTIFIER: US 5876733 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: March 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University					02
Washington University					02

APPL-NO: 08/ 469880 [PALM]
DATE FILED: June 6, 1995

PARENT-CASE:
This is a continuation of application Ser. No. 08/302,832, filed as PCT/US93/02166 Mar. 16, 1993, now U.S. patent Ser. No. 5,603,938.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [06] A61 K 39/102

US-CL-ISSUED: 424/256.1; 424/193.1, 424/197.11, 424/185.1, 530/350, 536/23.1, 536/23.7
US-CL-CURRENT: 424/256.1; 424/185.1, 424/193.1, 424/197.11, 530/350, 536/23.1, 536/23.7

FIELD-OF-SEARCH: 424/256.1, 424/197.11, 424/193.1, 424/185.1, 530/350, 536/23.1, 536/23.7

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

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Pediatric Infectious Disease Journal, vol. 9, No. 5, issued May 1990, S.J. Barenkamp et al., "Development of Serum Bactericidal Activity Following Nontypable Haemophilus influenzae Acute Otitis Media", pp. 333-339, see entire document.
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al., "110 Kilodalton Recombinant Protein which is Immunoreactive with Sera from Humans, Dogs, and Horses with Lyme Borreliosis", pp. 2418-2423, see entire document.
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The Journal of Infectious Diseases, vol. 165 (Suppl.), issued Aug. 1992, S.J.Barenkamp, "Outer Membrane Protein and Lipopolysaccharides of Nontypeable Haemophilus influenzae", pp. S181-S184, see entire document.
Infection and Immunity, vol. 60(40, issued Apr. 1992, S.J.Barenkamp et al., Cloning, Expression and DNA Sequence Analysis of Genes Encoding Nontypable Haemophilus influenzae High-Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of Bordetella pertussis pp. 1302-1313, see entire document.
Infection and Immunity, vol. 56(1), issued Jan. 1988, E.J. Hansen, Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus influenzae, pp. 182-190, see entire document, especially Figures 3 and 4.
Infection and Immunity, vol. 52(2), issued May 1986, S.J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemophilus influenzae Otitis Media", pp. 572-578, see Figures 1 and 2.
Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R.A. Young et al, "Efficient Isolation of Genes by Using Antibody Probes", pp. 1194-1198, see entire document.
Infection and Immunity, vol. 45(3), issued Sep. 1984, R. Schneerson et al, "Serum Antibody Responses of Juvenile and Infant Rhesus Monkeys Injected with Haemophilus influenzae Type b and Pneumococcus Type 6A Capsular Polysaccharide-Protein Conjugates", pp. 582-591, see entire document.
Journal of Molecular Biology, vol. 157, issued 1982, J. Kyte et al, "A Simple Method for Displaying the Hydropathic Character of a Protein", pp. 105-132, see entire document.
Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T.P.Hopp et al, "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.
Pediatr. Infect. Dis. J., 9: 333-339, 1990, Stephen J. Barenkamp and Frank F. Bodor, "Development of Serum Bacterial Activity Following Nontypable Haemophilus influenzae Acute Otitis Media".

ART-UNIT: 161

PRIMARY-EXAMINER: Housel; James C.

ASSISTANT-EXAMINER: Shaver; Jennifer

ABSTRACT:

High molecular weight surfaces proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

2 Claims, 68 Drawing figures

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L1: Entry 7 of 15 File: USPT Apr 17, 2001

US-PAT-NO: 6218141
DOCUMENT-IDENTIFIER: US 6218141 B1

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: April 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

US-CL-CURRENT: 435/69.1; 424/185.1, 424/256.1, 435/69.3, 435/71.1, 435/71.2, 530/350

CLAIMS:

What I claim is:

1. A method for the production of an isolated and purified high molecular weight protein of non-typeable Haemophilus which is HMW1, encoded by a DNA sequence having the nucleic acid sequence recited in SEQ ID No: 1 and having an apparent molecular weight of about 125 kDa, which comprises:

assembling an expression vector containing the nucleic acid sequence recited in SEQ ID No: 1 which encodes the high molecular weight protein, HMW1, and a promoter operatively coupled to said nucleic acid sequence of SEQ ID No: 1

transforming a host cell with the expression vector,

expressing the HMW1 protein in the host cell, and

isolating and purifying the expressed HMW1 protein.

2. The method of claim 1 wherein said HMW1 protein has the amino acid sequence as set forth in SEQ ID NO:2.

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WEST

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L1: Entry 7 of 15 File: USPT Apr 17, 2001

US-PAT-NO: 6218141
DOCUMENT-IDENTIFIER: US 6218141 B1

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: April 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO			02
Washington University	St. Louis	MO			02

APPL-NO: 08/ 719641 [PALM]
DATE FILED: September 25, 1996

PARENT-CASE:
This is a division of application Ser. No. 08/302,832 filed Oct. 5, 1994, now U.S. Pat. No. 5,603,938 the national phase of International Application No. PCT/US93/02166, filed Mar. 16, 1993 which claims priority to GB 9205704.1 filed Mar. 16, 1992.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

INT-CL: [07] C12 P 21/06

US-CL-ISSUED: 435/69.1; 435/69.3, 435/71.1, 435/71.2, 530/350, 424/185.1, 424/256.1
US-CL-CURRENT: 435/69.1; 424/185.1, 424/256.1, 435/69.3, 435/71.1, 435/71.2, 530/350

FIELD-OF-SEARCH: 424/256.1, 424/197.11, 424/185.1, 530/350, 435/69.3, 435/69.1, 435/69.7, 435/71.1, 435/71.2

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	6013514	January 2000	Chong et al.	

OTHER PUBLICATIONS

Pediatric Infectious Disease Journal, vol. 9, No. 5, issued May 1990, S.J. Barenkamp et al., "Development of Serum Bactericidal Activity Following Nontypable Haemophilus influenzae Acute Otitis Media", pp. 333-339, see entire document.
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Infection and Immunity, vol. 56(1), issued Jan. 1988, E.J. Hansen, Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus influenzae, pp. 182-190, see entire document, especially Figures 3 and 4.
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Pediatr. Infect. Dis. J., 9: 333-339, 1990, Stephen J. Barenkamp and Frank F. Bodor, "Development of Serum Bacterial Activity Following Nontypable Haemophilus influenzae Acute Otitis Media".
Green et al, Infection and Immunity 61:1950-1957, 1993.
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Barenkamp, Pediatric Research vol. 29, 167A, Abstract 985, 1991.
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Barenkamp et al (4) Pediatr. Infect Dis J. 9:333-339, 1990.*
Barenkamp et al, (5) Abstracts of the fifth Internation Symp. Recent Adv. in Otitis Media p. 119 A6-133, 1991.

ART-UNIT: 165

PRIMARY-EXAMINER: Graser; Jennifer

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immudominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

2 Claims, 68 Drawing figures

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L1: Entry 14 of 15 File: USPT Feb 18, 1997

US-PAT-NO: 5603938
DOCUMENT-IDENTIFIER: US 5603938 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 18, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

US-CL-CURRENT: 424/256.1; 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7, 536/24.1

CLAIMS:

What I claim is:

1. An isolated and purified gene which encodes a high molecular weight protein having the amino acid sequence of SEQ ID: 2.

2. The gene of claim 1 having the DNA sequence of SEQ ID: 1.

3. The isolated and purified gene cluster of a non-typeable Haemophilus strain comprising the sequence of SEQ ID: 5.

08/302832

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L1: Entry 14 of 15 File: USPT Feb 18, 1997

US-PAT-NO: 5603938
DOCUMENT-IDENTIFIER: US 5603938 A

TITLE: High molecular weight surface proteins of non-typeable haemophilus

DATE-ISSUED: February 18, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO			02
Washington University	St. Louis	MO			02

APPL-NO: 08/ 302832 [PALM]
DATE FILED: October 5, 1994

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9205704	March 16, 1992

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102(E)-DATE
PCT/US93/02166	March 16, 1993	WO93/19090	Sep 30, 1993	Oct 5, 1994	Oct 5, 1994

INT-CL: [06] A61 K 39/102, C07 H 19/00, C07 H 21/00, C07 H 21/02

US-CL-ISSUED: 424/256.1; 536/22.1, 536/23.1, 536/23.7, 536/24.1, 435/69.1, 435/69.3
US-CL-CURRENT: 424/256.1; 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7, 536/24.1

FIELD-OF-SEARCH: 536/22.1, 536/23.7, 536/231, 536/23.1, 536/24.1, 530/300, 530/350, 435/69.1, 435/69.3, 435/91.1, 424/256.1

PRIOR-ART-DISCLOSED:

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Infection and Immunity, voll 56(1), Issued Jan. 1988, E. J. Hansen, "Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus Influenzae," pp. 182-190, see entire document, especialty FIGS. 3 and 4.
Infection and Immunity, vol. 52(2), issued May 1986, S. J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemophilus influenzae Otitis Media", pp. 572-578, see FIGS. 1 and 2.
Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R. A. Young et al., "Efficient Isolation of Genes by Using Antibody Probes", pp. 1194-1198, see entire document.
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Barenkamp, Abstract 983, Pediatric Research vol. 27.
Young et al., PNAS 80:1194-1198, 1983.
Houghten et al. Vaccine 86 pp. 21-25.
Green et al, Infection and Immunity 61:1950-1957 1993.
Erwin et al. Can Journ of Microbiology 34: 723-729, 1988.
Thomas et al. Infection & Immunity 58:1909-1913, 1990.
Barenkamp, Pediatric Research vol. 20, N67A, Abstract 985, 1991.

ART-UNIT: 182

PRIMARY-EXAMINER: Sidberry; Hazel F.

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus inflenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HMW3 and HMW4 have been cloned, expressed and partially sequenced.

3 Claims, 10 Drawing figures

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L1: Entry 11 of 15 File: USPT Jul 27, 1999

US-PAT-NO: 5928651
DOCUMENT-IDENTIFIER: US 5928651 A

TITLE: Gene encoding high molecular surface protein-2 non-typeable haemophilus

DATE-ISSUED: July 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
St. Louis University	St. Louis	MO			02
Washington University	St. Louis	MO			02

APPL-NO: 08/ 728470 [PALM]
DATE FILED: October 10, 1996

PARENT-CASE:
This is a continuation of application Ser. No. 08/302,832 filed Oct. 5, 1994 now U.S. Pat. No. 5,603,938, which is a national phase filing of International Appl. No. PCT/US93/02166, filed Mar. 16, 1993.

INT-CL: [06] A61 K 39/102, C07 H 19/00, C07 H 21/02, C07 H 21/04

US-CL-ISSUED: 424/256.1; 424/184.1, 536/22.1, 536/23.1, 536/23.7, 435/69.1, 435/69.3
US-CL-CURRENT: 424/256.1; 424/184.1, 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7

FIELD-OF-SEARCH: 424/256.1, 536/22.1, 536/23.1, 536/23.7, 536/24.1, 435/69.1, 435/69.3

PRIOR-ART-DISCLOSED:

OTHER PUBLICATIONS

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Journal of Clinical Microbiology, vol. 29, No. 11, issued Nov. 1991, A.C. Caputa et al., "110 Kilodalton Recombinant Protein which is Immunoreactive with Sera from Humans, Dogs, and Horses with Lyme Borreliosis", pp. 2418-2423, see entire document.
Joint Meeting of the American Pediatric Society and the Society for Pediatric Research, May 07-10, 1990, S.J. Barenkamp, "Cloning and Expression of Genes for Nontypable Haemophilus influenzae (NTHI) High Molecular Weight (HMW) Outer Membrane Proteins which are Targets of Bactericidal Antibody", Abstract 983, Pediatric Research, vol. 27, (4 part 2).
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Infection and Immunity, vol. 60(4), issued Apr. 1992, S.J.Barenkamp et al, Cloning,

Expression and DNA Sequence Analysis of Genes Encoding Nontypable Haemophilus influenzae High-Molecular-Weight Surface-Exposed Proteins Related to Filamentous Hemagglutinin of Bordetella pertussis pp. 1302-1313, see entire document.
Infection and Immunity, vol. 56(1), issued Jan. 1988, E.J. Hansen, Immune Enhancement of Pulmonary Clearance on Nontypable Haemophilus influenzae, pp. 182-190, see entire document, especially Figures 3 and 4.
Infection and Immunity, vol. 52(2), issued May 1986, S.J. Barenkamp, "Protection by Serum Antibodies in Experimental Nontypable Haemophilus influenzae Otitis Media", pp. 572-578, see Figures 1 and 2.
Proceedings of the National Academy of Sciences USA, vol. 80, issued Mar. 1983, R.A. Young et al., "Efficient Isolation of Genes by Using Antibody Probes", pp. 1194-1198, see entire document.
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Journal of Molecular Biology, vol. 157, issued 1982, J. Kyte et al, "A Simple Method for Displaying the Hydropathic Character of a Protein", pp. 105-132, see entire document.
Proceedings of the National Academy of Sciences, vol. 78(6), issued Jun. 1981, T.P.Hopp et al., "Prediction of Protein Antigenic Determinants from Amino Acid Sequences", pp. 3824-3828, see entire document.
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Erwin et al, Can. Journ.of Microbioligy 34:, 723-729, 1988.
Thomas et al., Infection and Immunity, 58: 1909-1913, 1990.
Barenkamp, Pediatric Research vol. 29, 167A, Abstract 985, 1991.
Barenkamp, Abstract 983, Pediatric Research vol. 27.
Houghten et al, Vaccine 86, pp. 21 to 25.

ART-UNIT: 182

PRIMARY-EXAMINER: Sidberry; Hazel F.

ABSTRACT:

High molecular weight surface proteins of non-typeable Haemophilus influenzae which exhibit immunogenic properties and genes encoding the same are described. Specifically, genes coding for two immunodominant high molecular weight proteins, HMW1 and HMW2, have been cloned, expressed and sequenced, while genes coding for high molecular proteins HKW3 and HMW4 have been cloned, expressed and partially sequenced.

3 Claims, 68 Drawing figures

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L1: Entry 11 of 15 File: USPT Jul 27, 1999

US-PAT-NO: 5928651
DOCUMENT-IDENTIFIER: US 5928651 A

TITLE: Gene encoding high molecular surface protein-2 non-typeable haemophilus

DATE-ISSUED: July 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Barenkamp; Stephen J.	Webster Grove	MO		

US-CL-CURRENT: 424/256.1; 424/184.1, 435/69.1, 435/69.3, 536/22.1, 536/23.1, 536/23.7

CLAIMS:

What I claim is:

1. An isolated and purified gene which encodes a high molecular weight protein having the amino acid sequence of SEQ ID NO: 4.

2. The gene of claim 1 having the DNA sequence of SEQ ID NO: 3.

3. An isolated and purified gene cluster of a non-typeable Haemophilus strain comprising the sequence of SEQ ID No: 6.